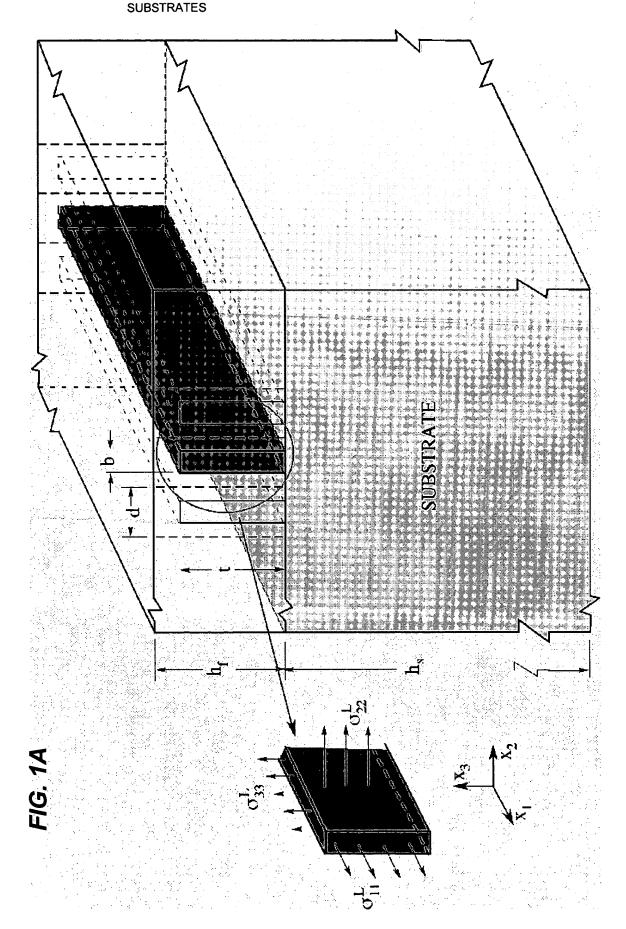
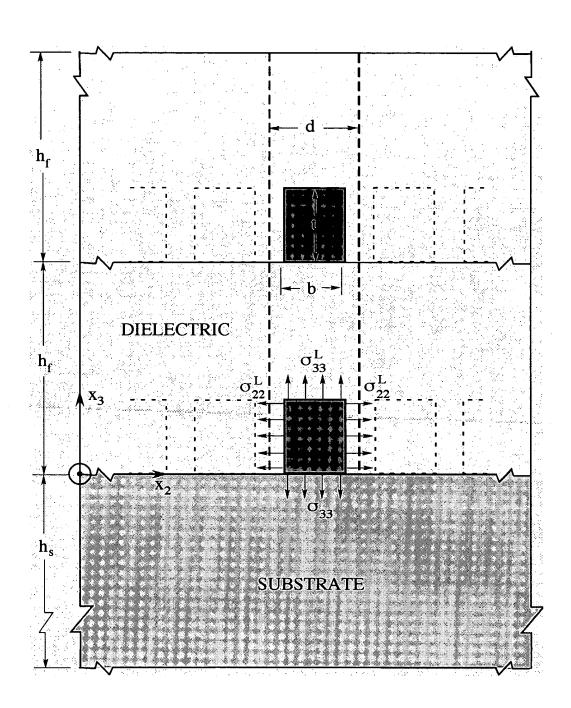
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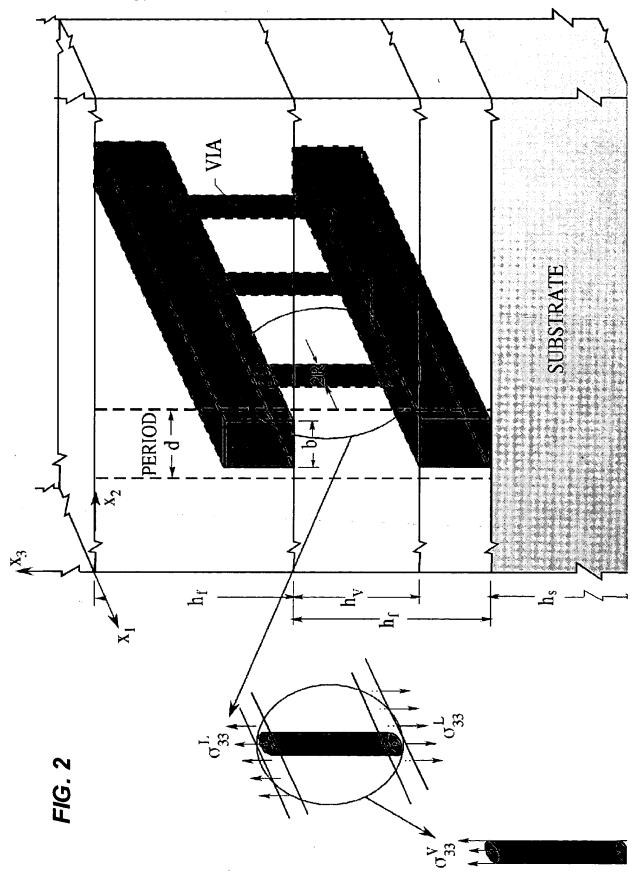
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FIG. 1B



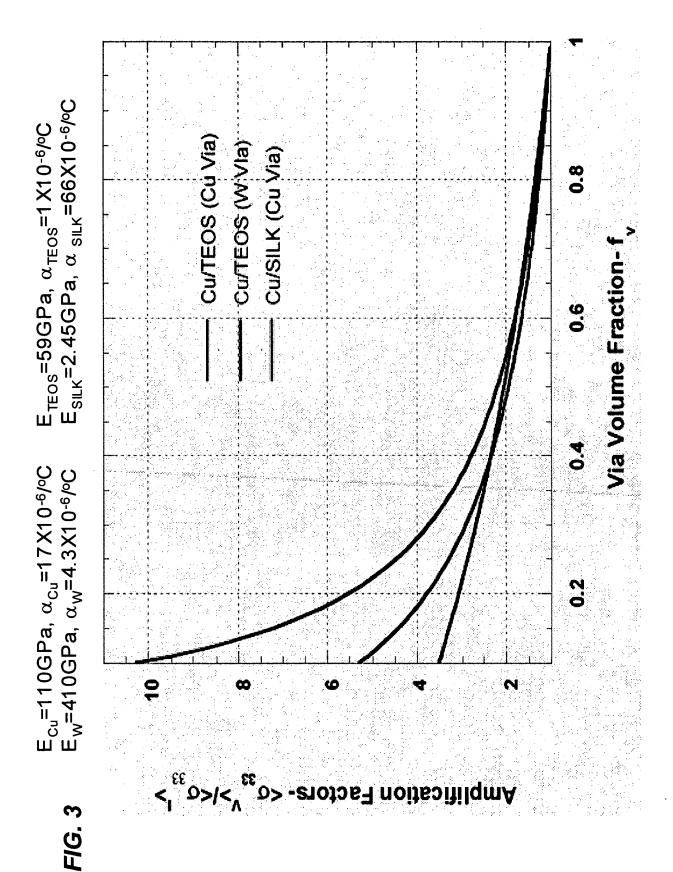
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FIG. 4

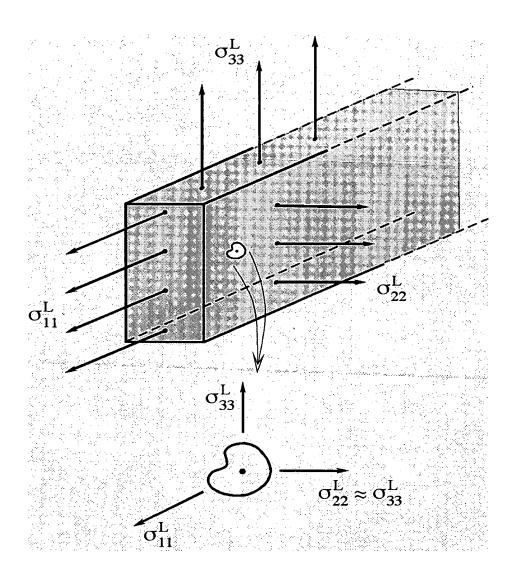
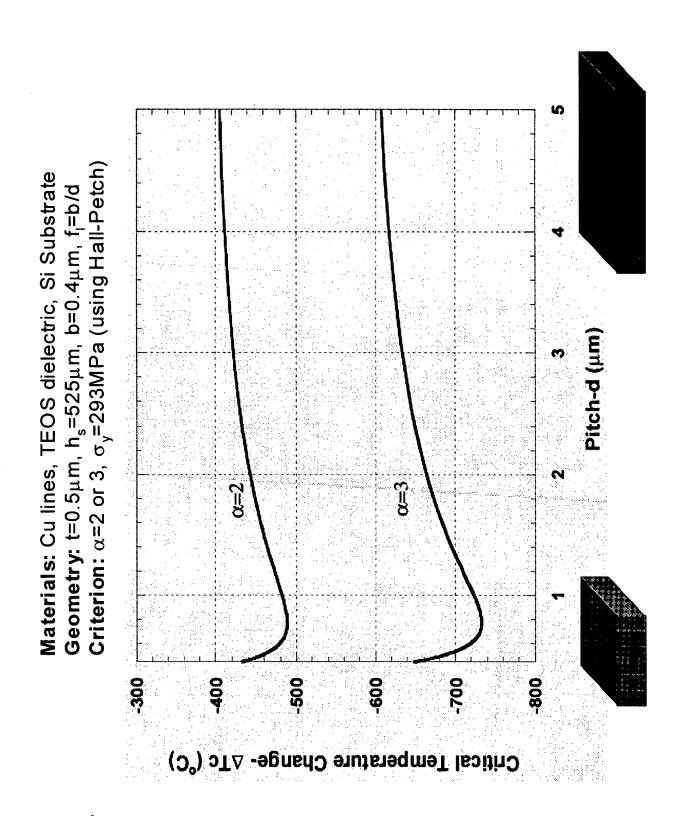


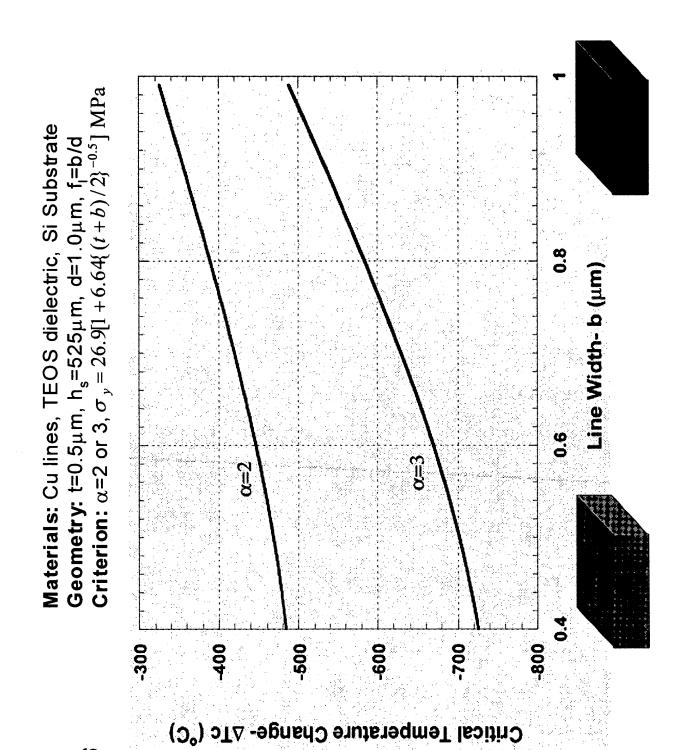
FIG. 5



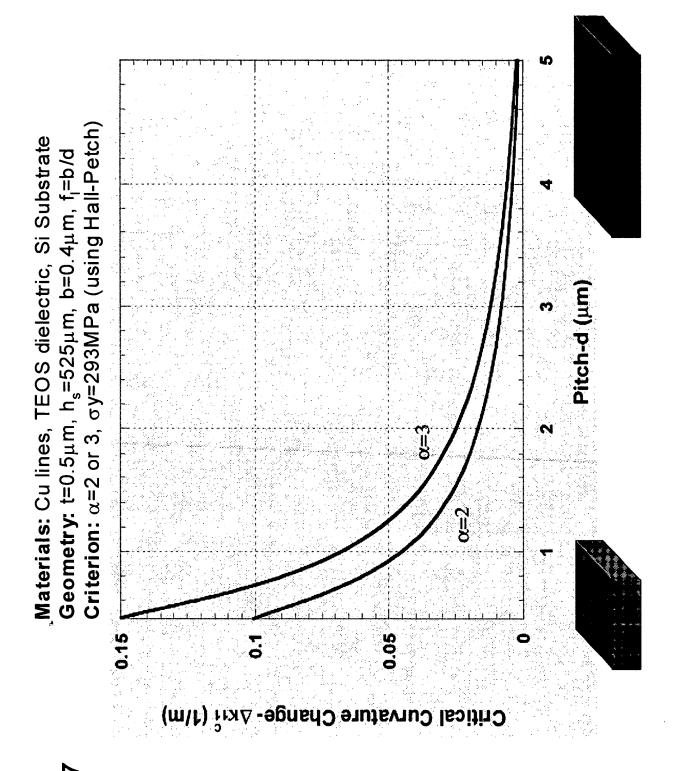
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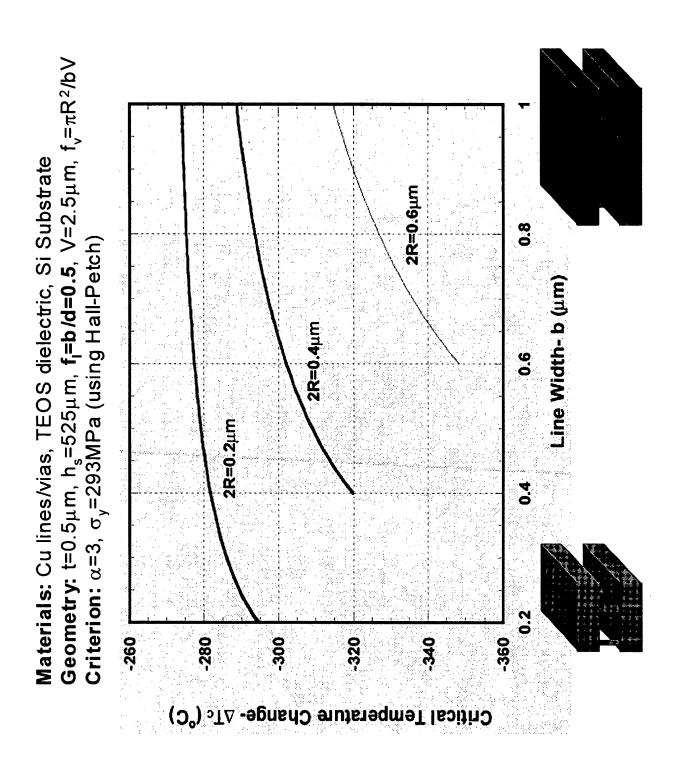


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F/G. 7

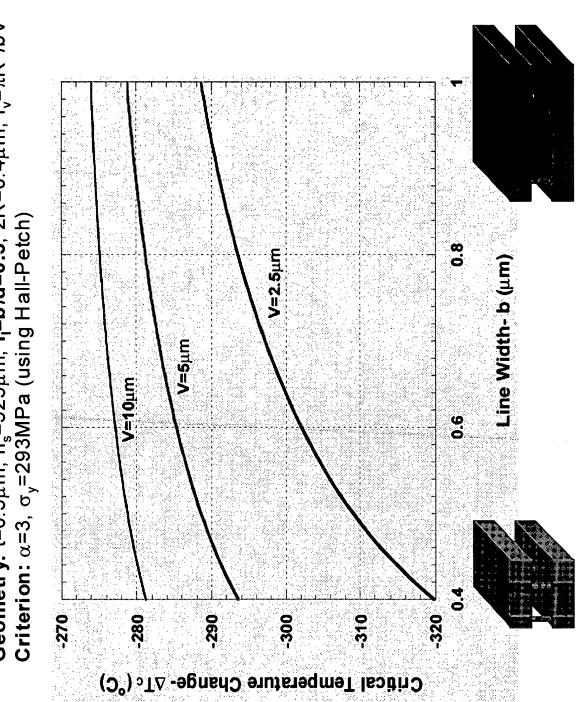
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Applicant(s): Ares Rosakis, et al.
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F/G. 8

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Geometry: $t=0.5\mu$ m, $h_s=525\mu$ m, f_1 =b/d=0.5, $2R=0.4\mu$ m, $f_v=\pi R^2/bV$ Criterion: $\alpha=3$, $\sigma_v=293MPa$ (using Hall-Petch) Materials: Cu lines/vias, TEOS dielectric, Si Substrate



F/G. 9

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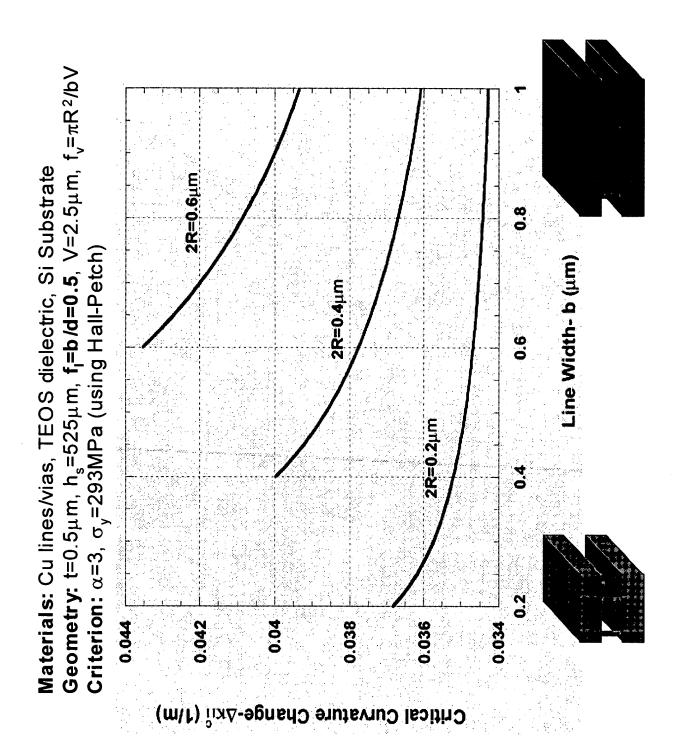


FIG. 10

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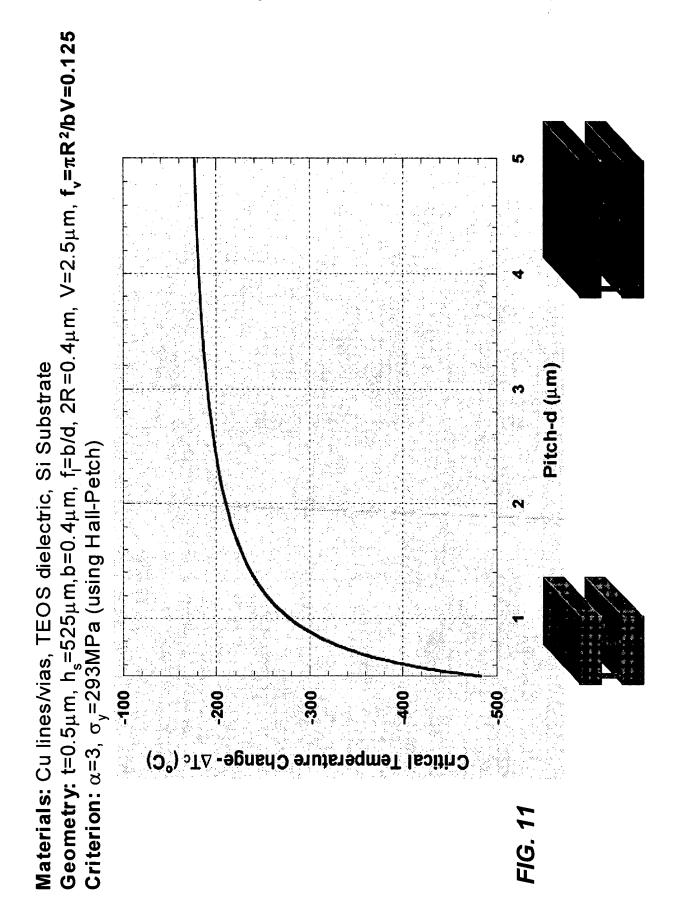


FIG. 12

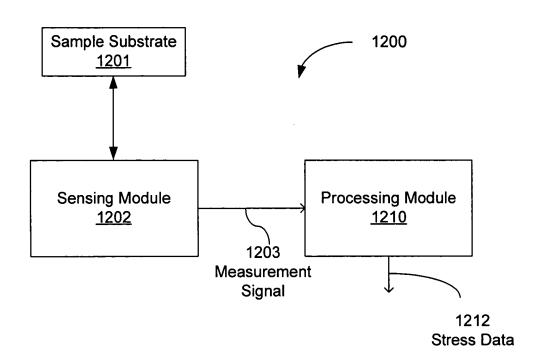
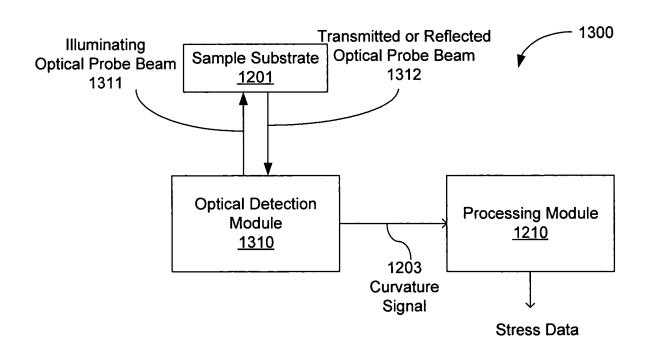
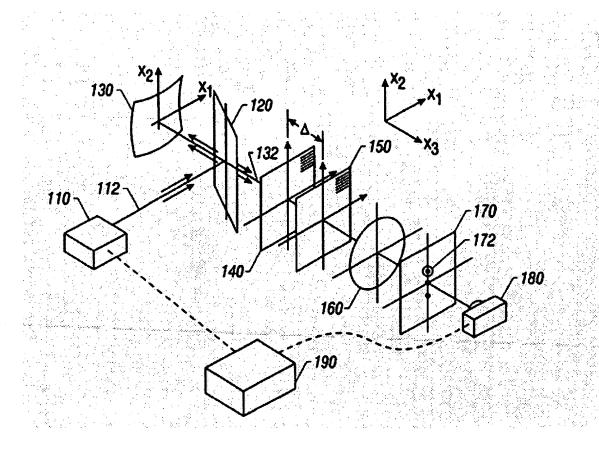


FIG. 13



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FIG. 14

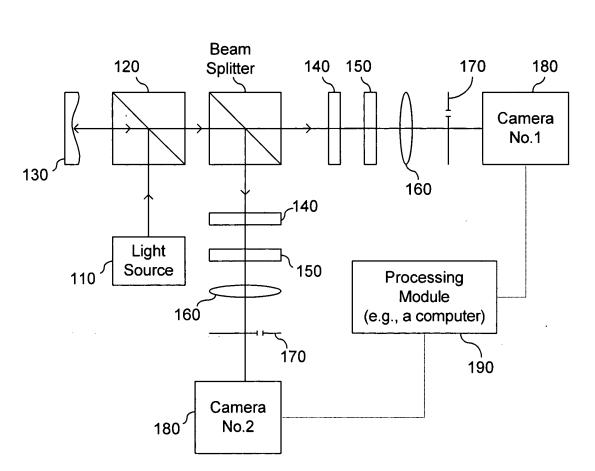


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FIG. 15





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FIG. 16

Illuminate an optical probe beam onto a substrate-based device with line features formed over the substrate to produce a transmitted or reflected probe beam which acquires surface spatial gradient information of the illuminated area (e.g., using an optical shearing interferometry system)

Process the surface gradient information in the reflected probe beam to simultaneously measure first and second curvatures at a location of a line feature along the longitudinal and transverse directions of the line feature

Compute stresses on the line feature by using an analytical function for a multi-layer structure based on measured first and second curvatures